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Natural gas or methane is an excellent energy vector, with the lowest Carbon to Hydrogen ratio of all the hydrocarbons, according to NGVA Europe’s general manager Manuel Lage’s presentation. It is an alternative fuel coming from natural wells, which mainly consists of methane (CH4).

The renewable form of this gas, so-called biogas, is also methane rich, produced by the fermentation of the biomass.

Methane has less carbon molecules compared to traditional fuels.
- Methane contents 25 percent H and 75 percent Carbon (C), in weight
- Petrol contents 13.5 percent H and 86.5 percent C
- Diesel oil contents 13.5 percent H and 86.5 percent C
- LPG contents 17.4 percent H and 82.6 percent C

Biogas can be further purified into biomethane which has 80 to 98 percent methane content. Biogas that is upgraded to pipeline quality-standard can be used interchangeably with fossil natural gas.

Natural Gas Vehicles (NGVs) are today the best and most economic alternative to oil derived fuels. Using natural gas in transportation reduces gaseous and acoustic emissions of the vehicles.

Thanks to a well known and mature car and commercial vehicle technology, natural gas can be used in existing internal combustion engines with minor additional investments. Dual Fuel diesel/LNG or diesel/CNG technology offers the possibility of conversion for existing engines.

Natural gas has been used so far as CNG mainly for urban applications, but also for private cars. Meanwhile, the availability of LNG will spread its use for medium and long distances road transport, mainly for Heavy-Duty Commercial Vehicles such as trucks, trailers, etc.

In terms of Medium and Heavy-Duty transports, both CNG and LNG are...
commonly used in America, Asia, and Europe but also in Egypt. In Africa, leading NGV nation Egypt is laying its hopes on natural gas to help reducing energy subsidies that are eating up 20 percent of its state budget and are likely to continue growing.

Natural gas in Heavy-Duty Vehicles

In Heavy-Duty Transport segment, CNG is mainly used in buses, while LNG and dual fuel system mostly found in Heavy-Duty trucks with exceptions in Russia and China that have public LNG buses. In Africa, with Egypt as exception-interest in CNG is mainly focused on public bus segment. Using this fuel in such public transportation could give a more significant economic and ecological savings as buses needs a larger volume of fuels than cars to operate. Apart from that, the regular operation of the buses requires a stable and bigger amount of fuel to be purchased. As CNG is cheaper than petrol and diesel, the more fuel used, the bigger the savings. Algeria, Tunisia, Tanzania, and Mozambique have done the trials on CNG buses. Although Nigerian NGV market is mainly in car/taxi segment, various companies are keen to see CNG in trucks. In fact, Nigerian Coca Cola Company has converted some of its delivery trucks powered by diesel to dual fuel diesel/CNG system.

Gas-powered trucks

Just to give a few examples of the NG-HDVs use around the world, not only in Nigeria, Coca-Cola also recognized the advantage of using CNG in its delivery trucks all over the world. For example, this year in the United Kingdom, the firm bought 14 Iveco Stralis natural gas lorries after 12-month trial finds biomethane can help cut air and noise pollution. As mentioned above, biomethane has similar characteristics as natural gas. Therefore, no adjustment is required to allow biomethane instead of CNG to be used in any CNG vehicles. As per trial result, the gas-powered vehicles achieved an estimated 50.3 percent saving in well-to-wheel greenhouse gas emissions, compared to an Iveco diesel fuelled vehicle. As Coca Cola plans to install a natural gas filling station at the Enfield depot to facilitate this fleet, it is predicted that the company could cut greenhouse gas emissions by 60.7 percent.

The firm has also trialled a forklift truck converted to operate on biomethane at the Enfield site, which achieved a 71 percent well-to-wheel CO2 saving. The Stralis biomethane trucks also produced 85.6 percent less nitrogen oxides and 97.1 percent less PM emissions compared to the diesel-fuelled truck, and reduced noise levels by up to 10.5 decibels, making it more suitable for late night and early morning deliveries. Although gas-powered trucks are slightly more expensive than the diesel versions, this can be offset by CNG or biomethane fuel savings. All over the world, the gas costs much cheaper than diesel and petrol. The total cost of gas trucks ownership of Coca Cola would increase by 15.3 percent. However, biogas is...
12.8 percent cheaper than diesel in the UK (North London). Apart from various countries in Europe (Spain, UK, Sweden, The Netherlands, France, and many others), North America is known as the leading user of Heavy-Duty NGVs with many private fleets using CNG, LNG, or the biomethane version of this fuel to power public and school buses, waste collection trucks as well as long-haul commercial trucks.

Apart from CNG trucks, the NGV industry also offers dual fuel diesel/methane (CNG or LNG) solution. For the methane part CNG or LNG can be used in the vehicle, or Liquefied Biomethane Gas (LBG) or Compressed Biomethane (CBG). In May 2011, Volvo Trucks introduced Volvo FM Methane Diesel, a gas-powered truck designed for long-haul deliveries. The new technology in this Volvo truck allows a combination of up to 75 percent liquefied methane gas and 25 diesel, with the diesel serving as spark plug (assist the combustion process). With biogas in the fuel tank, CO2 emissions drop by up to 70 percent compared with a conventional diesel engine; with fossil-based gas, emissions drop by 10 percent. The dual fuel methane/diesel system is 30 to 40 percent more energy-efficient than a truck fitted with conventional-powered spark plugs engine.

Gas-powered buses

In 2004, US Department of Energy’s National Renewable Energy Laboratory (NREL) conducted an evaluation of the emissions of transit buses operated by the Washington Metropolitan Area Transit Authority (WMATA). The project was carried out to evaluate the emissions of natural gas transit buses and the improving baseline emissions of comparable diesel buses with advanced emission control technologies.

The buses included in the study consist of followings:
• CNG buses with model year (MY) 2004 John Deere 6081H engines, with oxidation catalysts
• CNG buses with MY 2001 Cummins Westport, Inc. (CWV) C Gas Plus engines, with oxidation catalysts
• Diesel buses with MY 2004 Detroit Diesel Corporation (DDC) Series 50 engines, with catalyzed particulate filters and EGR
• Diesel buses with MY 2000 DDC Series 50 engines, with catalyzed particulate filters.

The John Deere CNG buses produced 49 percent lower NOx emissions and 84 percent lower PM emissions compared with the MY 2004 DDC diesel buses, and 63 percent lower NOx emissions and 60 percent lower PM emissions compared with the MY 2000 DDC diesel buses. The CWI buses produced 6.1 percent higher NOx emissions and 60 percent lower PM emissions compared with the MY 2004 DDC diesel buses, and 23 percent lower NOx emissions and equal PM emissions compared with the MY 2000 DDC diesel buses.

In terms of fuel economy, the John Deere CNG buses showed a 9 percent improvement compared with the MY 2004 DDC diesel buses and a 2.9 percent improvement compared with the MY 2000 DDC diesel buses. The CWI CNG buses exhibited a fuel economy 4.2 percent higher than the MY 2004 DDC diesel buses and 1.6 percent lower than the MY 2000 DDC diesel buses. Both CNG engines use lean burn technology.

The emission reductions of CNG buses will increase when:
1. These are compared with diesel buses without particulate filters, and/or;
2. Biomethane is used in the CNG buses instead of natural gas.
3. Diesel buses without particulate filters are used as comparisons.

On the other hand, in the Netherlands, diesel particulate filters are no longer subsidized. Diesel particulate filters were filled with PM in a ‘reasonably’ short period. When this happened, and the filters were no longer deliver an optimal result, especially when these are not regularly cleaned. It was concluded that the diesel particulate filters are quite expensive considering the filter price versus advantages and product life cycle.

NGV deployment map: The Canadian example

In 2010, related stakeholders in Canada launched The Natural Gas Use in the Canadian Transportation Sector Deployment Roadmap initiative. As a result, a report with similar title is released. The report describes a technical guideline created to help fleets transition to Natural Gas Vehicle use. The report can be obtained at http://oee.nrcan.gc.ca/sites/oee.nrcan.gc.ca/files/pdf/transportation/alternative-fuels/resources/pdf/roadmap.pdf
Le gaz naturel ou le méthane est un excellent vecteur énergétique ayant le rapport carbone sur hydrogène le plus bas de tous les hydrocarbures selon le rapport de Manuel Lage directeur général de NGVA Europe. C’est un carburant alternatif provenant de réservoirs naturels contenant principalement du méthane (CH4).

La forme renouvelable de ce gaz, dénommé biogaz, est aussi riche en méthane, produit par la fermentation de la biomasse.

Le méthane a moins de molécules de carbone que les carburants traditionnels.
- Le méthane contient 25% d’hydrogène (H) et 75% de Carbone (C) en poids
- Le pétrole contient 13,5% de H et 86,5 % de C
- Le diesel contient 13,5 de H et 86,5 % de C
- Le LPG contient 17,4% de H et 82,6 de C

Le biogaz peut être purifié ensuite en biométhane qui contient 80 à 88 % de méthane le biogaz qui est amélioré au standard de la qualité réseau peut être interchangé avec le gaz naturel fossile.

Les véhicules au gaz naturel (NGVs) sont aujourd’hui la meilleure alternative et la plus économique par rapport aux carburants dérivés du pétrole. En utilisant le gaz naturel dans le transport, on réduit les émissions de gaz nocifs et on réduit le bruit des véhicules.

Grâce à une technologie bien connue, éprouvée et appliquée aux voitures et aux véhicules commerciaux le gaz naturel peut être utilisé dans les moteurs à combustion interne grâce à un investissement minime additionnel. Le système dual-fuel diesel/LNG ou diesel/CNG offre la possibilité de convertir les moteurs existants.

Le gaz naturel a été principalement utilisé sous la forme CNG pour des applications urbaines, mais également dans des voitures privées. Entre-temps, la mise à disposition de LNG étendra son utilisation pour des moyennes et longues distances, essentiellement pour des véhicules commerciaux tels que camions, semi-remorques, etc.

En termes de transport moyen et lourd, tant le CNG que le LNG sont utilisés communément en Amérique, Asie et Europe mais aussi en Égypte, en Afrique. L’Égypte, nation pilote NGV, met ses espoirs dans le gaz naturel pour l’aider à réduire les subsides énergétiques qui consomment 20% du budget de l’état et qui continuent à grandir.

**Le gaz naturel dans les véhicules lourds**

Dans le segment du transport par véhicules lourds, le CNG est principalement utilisé dans les bus tandis que le LNG et le Dual-Fuel sont utilisés dans les camions. En Russie et en Chine cependant, ils possèdent des bus publics au LNG.

En Afrique, à l’exception de l’Égypte, les intérêts sont plutôt dirigés vers le CNG utilisé dans les bus publics. En utilisant ce carburant pour le transport public des économies plus importantes peuvent être réalisées tant dans le domaine économique que le domaine écologique. En effet, les bus ont besoin d’une quantité plus importante de carburant que les voitures. Mis à part cela, opérer régulièrement des bus, exige une quantité de carburant stable et importante à approvisionner. Comme le CNG est moins cher que le diesel, au plus on utilise du carburant au plus les économies sont importantes.

L’Algérie, la Tunisie, la Tanzanie et le Mozambique ont réalisé des essais de bus au CNG. Quoique le marché nigerien NGV se situe dans le segment voiture/taxi, diverses compagnies préfèrent voir le CNG dans les bus et même dans les camions. La compagnie nigérienne Coca-Cola a converti quelques camions de livraison fonctionnant au diesel vers le système diesel/CNG.

**Gaz-chariots**

Juste pour donner quelques exemples de l’utilisation des NGHDVs dans le monde et pas seulement au Nigeria, Coca-Cola a reconnu aussi l’avantage de l’utilisation du CNG dans ses...
camions de livraison partout dans le monde. Par exemple, cette année au Royaume-Uni, la firme a acheté 14 Iveco Stralis au gaz naturel, après un essai de 12 mois prouvant que le biométhane peut réduire la pollution de l’air et le bruit. Comme renseigné plus haut, le biométhane a les mêmes caractéristiques que le gaz naturel. C’est pourquoi, aucun ajustement n’est à faire en passant du CNG au biométhane dans n’importe quel véhicule CNG.

A la suite d’essais, les véhicules au gaz atteignent une valeur estimée de 50,3 % de bénéfice des émissions de gaz à effet de serre well-to-wheel, comparé à un Iveco au diesel. Comme Coca-Cola envisage d’installer une station de remplissage de gaz naturel dans son dépôt de Enfield, lequel a atteint 71% de CO2 en moins well-to-wheel.

Les Stralis au biométhane ont produit 85,6 % en moins d’oxydes d’azote et 97,1 % de moins de PM, comparés au camion au diesel et le bruit est réduit de 10,5 dB les rendant plus agréables pour les livraisons tard le soir ou tôt le matin. Quoique les camions au gaz soient légèrement plus coûteux que les versions au diesel, ceci peut être effacé par les avantages du CNG ou du biométhane. Partout dans le monde, le prix du gaz est moins élevé que le prix du diesel et du pétrole.

Le coût total des camions au gaz, propriété de Coca-Cola, pourrait augmenté de 15,3%. Cependant le biogaz est de 12,8% moins cher que le diesel au RU (Nord de Londres). Mais déterminer l’efficacité exacte des véhicules au gaz naturel ou au biogaz nécessiterait une évaluation des émissions des “Transit buses” exploités par la Washington Metropolitan Area Transit Authority (WMATA). Le projet a été mis en place dans le but d’évaluer les émissions des bus au gaz naturel et les moyens d’augmenter les directives de base comparées aux bus diesel par des technologies possédant un contrôle précis des émissions.


Les bus CNG John Deere ont produit 49% de moins de NOx et 84% de moins de PM comparés aux MY 2004 DDC bus diesel et 63% de moins de NOx et 60% de moins de PM comparés aux MY 2000 DDC bus diesel.

Les moteurs CWI ont produit 6,1% de plus de NOx et 60% de moins de PM comparés aux MY2004 DDC bus diesel et 23% de moins de Nox...
et l'équivalent en PM comparés aux MY 2000 DDC bus diesel.

En termes d'économie d'énergie, les bus John Deere CNG ont montré un gain de 9% comparé aux bus équipés de MY 2004 DDC diesel et 2.9% comparé aux bus équipés de MY 2000 DDC diesel. Les bus équipés de moteurs CWI CNG ont montré une économie de 4.2% plus élevée que les bus avec moteurs MY 2004 DDC diesel et 1.6% plus basse que les bus avec moteurs MY 2000 DDC diesel. Les bus au CNG utilisent la technologie "lean burn".

Les réductions d'émissions des bus au CNG diminueront encore quand: 1. ils sont comparés aux bus diesel non équipés de filtres à particules, et/ou ; 2. le biométhane est utilisé à la place du gaz naturel ; 3. Bus diesel sans filtres à particules sont utilisés comme des comparaisons.

Aux Pays-Bas, les filtres à particules pour moteur diesel ne sont plus subsidiés. Les filtres sont obstrués par des PM en un temps record. Lorsque cela arrive, les filtres n'ont plus d'effet et plus spécialement quand ils ne sont pas régulièrement nettoyés.

Il a été conclu que les filtres diesel à particules sont onéreux eu égard au prix du filtre et à sa faible durée de vie comparés à ses avantages.

Plan de développement : l'exemple canadien

En 2010, plusieurs partenaires au Canada ont lancé l'initiative Natural Gas Use in the Canadian Transportation Sector Deployment Roadmap. Comme résultat, un rapport portant le même nom a été publié. Ce rapport décrit une méthode technique créée pour aider les flottes à passer à l'utilisation du gaz naturel comme carburant.


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Vergelijkende studie van aardgas / biogas ten opzichte van diesel HDVs

“Aardgas is een uitstekende energiedrager, met de laagste carbon/waterstofverhouding van alle koolwaterstoffen”, aldus de presentatie van NGVA Europa’s general manager Manuel Lage. Het is een alternatieve brandstof uit natuurlijke bronnen, die voornamelijk bestaat uit methaan (CH4).

De hernieuwbare vorm van dit gas, zogenaamd biogas, is methaan rijk door de fermentatie van de biomassa.

Methaan heeft minder koolstof moleculen in vergelijking met traditionele brandstoffen per gewicht.
- Methaan: Koolstof (C) gehalte van 75 procent
- Benzine: Koolstof (C) gehalte van 86,5 procent
- Diesel: Koolstof (C) gehalte van 86,5 procent
- LPG: Koolstof (C) gehalte van 82,6 procent

Door biogas verder te zuiveren verkrijgt men bio methaan wat een methaangehalte van 80 tot 98 procent (gewicht). De kwaliteit van Biogas kan worden opgewerkt tot de standaard waarden voor pijplijn gas en is dan uitwisselbaar met aardgas.

Natural Gas Vehicles [NGVs] zijn vandaag het beste en het meest economische alternatief voor op olie gebaseerde brandstoffen. Met behulp van aardgas in het transport kunnen daarenboven de akoestische emissies van de voertuigen verminderd worden.

Dankzij een bekende en goed ontwikkelde technologie die al langer wordt toegepast bij auto’s en bedrijfsauto’s, kan aardgas, met een geringe extra investering, worden gebruikt in bestaande verbrandingsmotoren. Dual Fuel, diesel / LNG of diesel / CNG-technologie, biedt die mogelijkheid tot omzetting van de bestaande motoren.

Aardgas is tot nu toe voornamelijk gebruikt als CNG voor stedelijke toe-passingen en daar naast ook voor privé-auto’s. Tegelijkertijd is ook de verspreiding en beschikbaarheid van LNG toe genomen waardoor de toepasbaarheid voor middellange en lange afstanden, vooral voor de Heavy-Duty Commercial Vehicles, zoals vrachtauto’s, trailers, enz, steeds verder verbeterd.

In Amerika, Azië en Europa, maar ook in Egypte worden zowel CNG en LNG veel gebruikt in het Medium-en Heavy-Duty transport segment. In Egypte, het grootste NGV land van Afrika, hoopt men door het aardgas gebruik te bevorderen de kosten van energiesubsidies op benzine/diesel te verlagen. De subsidie neemt nu 20 % van de staats uitgaven in beslag, en dit zal wrs. nog verder toenemen bij uitblijven van oplossingen.

Aardgas in zware voertuigen

In het zware transport segment (HDV), wordt CNG voornamelijk gebruikt in bussen, terwijl de LNG-en dual fuel systeem vooral zijn te vinden in zware trucks. Met uitzondering van Rusland en China waar LNG-bussen in gebruik zijn voor het openbaar vervoer.

In Afrika, met Egypte als uitzondering, zijn de belangen in CNG vooral gericht op het openbaar vervoer-segment. Door toepassing van CNG in het openbaar vervoer, kan een belangrijke economische en ecologische besparingen gerealiseerd worden. Bussen hebben enerzijds grotere hoeveelheid brandstof nodig en rijden tevens een meer reguliere route (wat de implementatie vereenvoudigt).

Omdat CNG goedkoper is dan benzine en diesel, neemt de het economisch voordeel toe naar mate er meer brandstof wordt gebruikt.

Algerije, Tunesië, Tanzania en Mozambique hebben proeven gedaan met aardgasbussen. Hoewel de NGV markt in Nigeriaanse nu nog vooral actief is in het auto / taxi segment, zien diverse partijen graag een toenemen van gebruik van CNG in stads bussen of zelfs vrachtwagens. De Nigeriaanse Coca Cola Company, is hier al op vooruit gelopen door een aantal van haar diesel vrachtwagens om te zetten naar dual fuel diesel / CNG-systeem.
Gas-aangedreven trucks

Om een voorbeeld te geven van NG-HDVs gebruik in de wereld: Niet allen in Nigeria zag Coca Cola de mogelijkheden van NG-HDVs, Coca-Cola ziet ook een voordeel in het gebruik van CNG bij vrachtwagens in de rest van de wereld. Bijvoorbeeld, dit jaar in het Verenigd Koninkrijk, de firma kocht 14 Iveco Stralis aardgas vrachtwagens en vond, na 12 maanden onderzoek, dat bio methaan kan bijdragen aan vermindering van luchtvervuiling en geluidsoverlast. Zoals hierboven vermeld, heeft bio methaan dezelfde eigenschappen als aardgasgas. Daarom is geen aanpassing nodig om het gebruik van bio methaan in plaats van CNG in alle CNG-voertuigen mogelijk te maken.

In deze proef is een besparing (van “well-to-wheel”) in de uitstoot van boeikasgassen, door gas aangedreven voertuigen, bereikt van naar schatting 50,3 procent in vergelijking met die van een Iveco diesel aangedreven voertuig. Als Coca Cola een aardgas tankstation aan het Enfield depot neer zet is te verwachten dat het bedrijf de uitstoot van broeikasgassen nog verder kan verlagen tot 60,7 procent verminderde uitstoot.

Het bedrijf heeft bij de Enfield site ook een test gedaan met een vorkheftruck met bio methaan, die een CO2 uitstoot vermindering van 71 procent (well-to-wheel) liet zien. De Stralis bio methaan trucks lieten ook een vermindering van de uitstoot van stikstofoxideen zien van maar liefst 85,6 procent gekoppeld aan een vermindering van 97,1 procent van de uitstoot van fijn stof, in vergelijking met de diesel aangedreven truck. Ook was de lawaai productie met 10,5 decibel verminderd, waardoor zij meer geschikt worden voor late nacht en vroege ochtend leveringen. Hoewel de gas-aangedreven trucks iets duurder zijn dan de diesel versies, kan dit ruimschoots worden gecompenseerd door de besparingen op de brandstof door het gebruik van CNG of bio methaan. Over de hele wereld is de kostprijs van deze brandstoffen nu eenmaal lager dan van diesel en benzine.

De totale kosten van gas-trucks eigendom voor Coca-Cola zouden met 15,3 procent toenemen. Maar biogas is 12,8 procent goedkoper dan diesel in het Verenigd Koninkrijk (Noord-Londen) en levert dus directe besparingen per kilometer op.

Naast diverse landen in Europa (Spanje, Verenigd Koninkrijk, Zweden, Nederland, Frankrijk en vele andere), is ook Noord-Amerika bekend als de toonaangevende gebruiker van Heavy-Duty NGVs en privé-vlotten met CNG, LNG en ook bio methaan veel toegepast in het openbaar vervoer, schoolbussen, vuilniswagens en lange afstand bedrijfswagens.

ontworpen voor langeafstanden. De nieuwe technologie in deze Volvo-truck kan een combinatie van maximaal 75 procent vloeibaar methaangas en 25 diesel, aan. WAar bij de diesel als ontstekers / bougie fungeert (help bij een goed verbrandingsproces). Met biogas in de brandstoftank, kan de CO2-uitstoot dalen met 70 procent in vergelijking met een conventionele dieselmotor; en met 10% in vergelijking met het gebruik van aardgas.

Het dual fuel methaan / diesel systeem is 30 tot 40 procent meer energie-efficiënt dan een conventioneel gas aangedreven truck uitgerust met bougies.

Gas-aangedreven bussen

In 2004 heeft de “US Department of National Renewable Energy Energy Laboratory” (NREL), een evaluatie van de emissies van stadsbussen van de “Washington Metropolitan Area Transit Authority” (WMATA) uitgevoerd.

Het project werd uitgevoerd om de uitstoot van aardgas stads bussen en de verbetering van de baseline-uitstoot van vergelijkbare dieselbussen met geavanceerde emissie technologieën, te evalueren.

De bussen in het onderzoek bestaan uit volgende:

- CNG bussen met modeljaar (MY) 2004 John Deere 6081H motoren, met een oxidatiekatalysator
- CNG bussen met MY 2001 Cummins Westport, Inc (CWII C Gas Plus motoren, met een oxidatiekatalysator
- Diesel bussen met MY 2004 Detroit Diesel Corporation (DDC) Series 50 motoren, met gekatalyseerde roetfilters en EGR
- Diesel bussen met MY 2000 DDC Series 50 motoren, met gekatalyseerde roetfilters.

De John Deere aardgasbussen produceerde 49 procent minder NOx-uitstoot en 84 procent lagere fijn stof emissies in vergelijking met de MY 2000 DDC dieselbussen en een 63 procent lagere uitstoot van NOx en 60 procent lagere emissies van fijn stof in vergelijking met de MY 2000 DDC dieselbussen.

De CWI bussen produceerden 6,1 procent hogere NOx-uitstoot en 60 procent lagere emissies van fijn stof in vergelijking met de MY 2004 DDC dieselbussen en 23 procent lagere uitstoot van NOx en gelijke PM- emissies in vergelijking met de MY 2000 DDC dieselbussen.

Het CWI CNG bussen vertoonden een lager brandstofverbruik 4,2 procent hoger dan de MY 2004 DDC dieselbussen en 1,6 procent lagere uitstoot van NOx en 60 procent lagere emissies van fijn stof in vergelijking met de MY 2000 DDC dieselbussen. Beide CNG motoren maken gebruik van lean burn technologie.

De emissiereducties van CNG voertuigen zal toenemen wanneer:

1. Deze worden vergeleken met dieselbussen zonder roetfilters en / of
2. Bio methaan wordt gebruikt in plaats van aardgas.

De conclusie was dat de roetfilters vrij duur zijn t.o.v. de te behalen voordelen (verminderde roet uitstoot) en de te verwachten levensduur product.

NGV inzet kaart: De Canadese voorbeeld


Globally, around 25.4 million Light-Duty Natural Gas Vehicles (LD-NGVs) would run across the world, according to Pike Research’s forecasts. This global-market-research company has projected that sales of LD-NGVs, including passenger cars, light-duty trucks and commercial vehicles will reach 3.2 million vehicles in 2019. This represents a compound average annual growth rate (CAGR) of 6.2 percent between 2012 and 2019. By July 2012, just over 15 million LD-NGVs around the world were recorded by the GVR statistics (see also the statistics page of NGVAfrica).

The Light-Duty segment in the total NGV sales of 2012 is projected to make up about 97 percent, or 2.08 million out of 2.15 million vehicles. Four main growth drivers were identified, which include economic benefits, environmental benefits, availability of fuel and vehicles, and energy security.

Strongest NGV region, Asia-Pacific, is expected to continue leading, with Thailand (24 percent CAGR), India (23 percent) and China (20 percent) being in the front rows, while Pakistan experiencing a volatility. North America is reported to experience 10 percent CAGR. The market largely consists of fleet purchases, not individual consumers. A two percent CAGR between 2012 and 2019 is anticipated for the Middle East and Africa regions. Egypt is well-known as a relatively strong light-duty vehicle market due to its taxi fleets.

The Latin American market will continue to grow. The two biggest nations in the region, Argentina and Brazil hold 25 percent share of the world’s total NGVs population. The other markets in this region are forecasted to have combines sales of less than 100,000 vehicles in 2012. The company forecasts about 10 percent CAGR each in Colombia, Bolivia, Peru, and Venezuela over the next several years. Other report by Infinity Research projected a total of 6.8 million NGVs (sales and conversion of all types vehicles) by 2015. See more notes about this below.

Leading market in Europe, Italy, is expected to witness 159,046 NGVs in 2012 sales. The sales in Ukraine are expected to reach 151,487 units. Both countries will see slowed growth over the next few years, while Germany and Sweden will see a steady growth.

To get this Pike Research report, please check http://www.pikere-search.com/research/light-duty-natu-ral-gas-vehicles

Meanwhile, TechNavio, another research firm, forecasted 19.8 million NGVs will ply around the globe by 2015. This figure would represent the total NGV population—not only sales of LD-HDVs. It means, around 3.4 million would be added to the current NGV population (16.4 million by July 2012). Economic benefits/savings accumulated from using compressed natural gas is recognized as one of the main drivers of the industry growth, while inadequate refuelling network seen as the biggest challenge. To read more about TechNavio report on “Global Compressed Natural Gas Vehicle Market 2011-2015”, visit http://www.theautochannel.com/lin k.html?http://www.researchandmar-kets.com/research/trcq3/global_c ompressed.

Infiniti Research recently published a report entitled “The Compressed Natural Vehicle market in Latin America”. According to the report, the region is expected to have 6.8 million units of NGVs by 2015.

One of the key factors contributing to this market growth is the cost advantage of using compressed natural gas. The NGV market in Latin America has also been witnessing an increasing number of bi-fuel vehicles. To get this report, visit http://www.reportstack.com/ product/86136/cng-vehicle-market-in-latin-america-2011-2015.html
In light of the large-scale plans to expand the service to wider areas across the nation, that number of filling points have been inaugurated so far this year. Six of them are located in the public transport depots affiliated to Cairo & Alexandria Transport Authorities, serving both public buses—the facilities are well-equipped to fuel 600 buses per day at the first phase—and the private vehicles.

A new fueling station was also opened in Minya Governorate (south of Egypt). The distribution network was extended a couple of years ago to Upper Egypt, which made it easier to establish several natural gas projects including the installation of CNG dispensing points.

"Setting up new CNG stations is showing so far the success and the ongoing development of NGV activities in Egypt, which started in 1996. Besides, further plans and campaigns will be potentially devised to encourage converting vehicles and buses to CNG," the Egyptian Minister of Petroleum Eng. Abdullah Ghorab said. By the end of June 2012, the number of natural gas fueling stations hence reached 159 and the CNG-converted vehicles amounted to over 173,000.

To ensure a wider spread of NGV use in the country, the gasoline stations are incorporating CNG fueling within their premises. On the other hand, cooperation with the vehicles assembling and manufacturing companies in Egypt is underway in order to convert vehicles to run on CNG on the production lines, in the context of the national project of replacing the old taxi cabs with new ones powered by CNG. Hyundai, BYD and Chevrolet are the frequent models used in this segment.

The Egyptian NGV authorities have already strengthened the main safety measures to ensure a safer operation of NGVs. They include testing the CNG cylinders installed in the converted vehicles, which is quite an important procedure to achieve the standard safety objectives. As a result, over 72,000 cylinders were tested till end of year 2011.

Other serious measures are being taken nowadays to cut the huge subsidies directed mainly to gasoline and diesel fuels, and that is why the CNG is seen as the best option due to its cheap price and availability.

Source: Hamdy Kamal, Gastec
Egypt plans to add 24,000 NGVs in 2012

African’s leading NGV country, Egypt, continues actively expanding NGV services to wider areas. Hence, the Egyptian NGV authorities set ambitious plans for the enlargement of CNG filling station network including the construction of 30 new stations across the country within this year.

Three new CNG stations were already opened in early May 2012. Two of those are located in a public transport garage in Basateen area in Cairo City. The stations serve both public buses and private vehicles. The third filling facility will be built in Suez City.

Also, around 24,000 NGVs is planned to be added. The Egyptian stakeholders seek to have more than 187,000 NGVs to ply on the roads by the end of 2012.

Given the significant (long) queues of vehicles waiting to be refueled in petrol stations, motorists are looking at CNG as the best possible alternative to petrol and diesel. Serious studies are being prepared and submitted to the authorities to speed up the wide scale improved-NGV adoption, with extra focus given to the public transport. Every year, the government offers huge funding to subsidized users of liquid fuels (petrol and diesel), resulting in a significant budget deficit. Thus, energy experts advise the government and public to switch to CNG. Egypt has a successful experience in the NGV segment. It also has the potentials to be one of major NGV countries in the future.

By: Hamdy Kamal, Board Affairs Department, Egyptian International Gas Technology (Gas Tec)
Mozambique to add two more stations soon

CNG filling station investors in Mozambique plan to build two more stations, hoping to increase the NGV adoption rate in the country. Currently, there are two CNG stations in Maputo and Matola. Maputo is the capital and largest city of Mozambique, while Matola city in southern Mozambique lies 12 kilometers to the west of the capital city. In July 2011, there were 433 Natural Gas Vehicles (NGVs) in the country. By July 2012, 500 bifuel Light-Duty Vehicles/cars and 150 CNG buses run across these two cities. The CNG buses are made by Original Equipment Manufacturers (OEMs)/bus producers, while the Light-Duty ones are after-market conversion vehicles. In average, 0.24 million NM3 CNG are used by those NGVs in 2012. Petrol is sold at 47.62 MZN/liter, diesel at 36.81 MZN/liter, and CNG at 17.75 MZN/kg, according to Stephan de Vos from Gigajoule. The lower heating value of each fuels is 8.80kWh, 10.00kWh, and 10.40 kWh respectively. It means, the cost of petrol is 0.16 MZN/kWh and 0.11 MZN/kWh for diesel. For CNG, the cost per kWh is only 0.05 MZN, making it the cheapest fuel for transport sector in this regards.
Gas finds in Mozambique and Tanzania

According to Aneki.com-world ranking and records website-Africa has proven gas reserves of around 14,022,078 million cubic meter in 24 listed countries. Recently, in June 2012, Statoil ASA and ExxonMobil Corporation announced their new findings: a second large gas discovery offshore southern Tanzania with estimated combined resource (with its first discovery) at as much as 9 trillion cubic feet (9 tcf=0.25 trillion cubic meter) of gas in place. Statoil operated Block 2 now contains the Lavani and Zafarani discoveries. The Lavani field holds an estimated 3 tcf of gas in place. Statoil has drilled a sidetrack at Zafarani, resulting in estimated 6 tcf gas in place. Tim Dodson, executive vice-president for exploration, said that the exploration result has marked an important step towards a possible natural gas development in Tanzania. Meanwhile, in Mozambique, new gas resource was found offshore the country. A partnership led by Anadarko Petroleum Corp. has announced the discovery that came out as a second major natural gas complex in Offshore Area 1 in the Rovuma basin. Anadarko estimated that the new complex contains 10 to more than 30 tcf of recoverable gas. A four-well appraisal program in the new complex will be begun soon, which has the potential to boost a large LNG development. Reserve certification and a final investment decision are expected to be booked by 2013, with first sales of LNG anticipated to be exercised by 2018.

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Country*</th>
<th>Million cubic meter of gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nigeria</td>
<td>5,246,000</td>
</tr>
<tr>
<td>2.</td>
<td>Algeria</td>
<td>4,502,000</td>
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<tr>
<td>3.</td>
<td>Egypt</td>
<td>1,656,000</td>
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<td>4.</td>
<td>Libya</td>
<td>1,539,000</td>
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<tr>
<td>5.</td>
<td>Angola</td>
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<td>6.</td>
<td>Cameroon</td>
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<td>7.</td>
<td>Mozambique</td>
<td>127,4</td>
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<tr>
<td>8.</td>
<td>The Republic of Congo</td>
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<tr>
<td>9.</td>
<td>Sudan</td>
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<td>10.</td>
<td>Tunisia</td>
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<td>11.</td>
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<td>13.</td>
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<td>15.</td>
<td>Gabon</td>
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<td>24.</td>
<td>South Africa</td>
<td>27.16</td>
</tr>
</tbody>
</table>

Source: Aneki.com
*Nigeria, Algeria, Egypt, Mozambique, Tunisia, Tanzania, and South Africa already have NGVs in their vehicle fleets, on trial or full implementation. Ethiopia has two OEM made biogas cars.
NGC underlined its commitment to promote Compressed natural gas

A subsidiary of state-owned Nigerian National Petroleum Corporation, Nigerian Gas Company Limited (NGC), in July 2012 re-instated its commitment to develop CNG-for-vehicles market in Nigeria. NGC managing director Saidu Mohammed confirmed the company’s total commitment to the promotion of alternative vehicular fuel to increase gas consumption in Nigeria. The commitment is largely accounted for a Joint Venture (JV) between Green Gas Limited with the Nigerian Independent Petrol (NIPCO). These JV acts as a platform for building gas infrastructure that could help developing the CNG market in line with the gas master plan. During his visit to NIPCO’s CNG station in Apapa-the major port of Lagos City-Mohammed said that the company had provided reliable infrastructure that could help CNG adoption in transport sector across the country. Mohammed, who is also the chairman of Green Gas, feels glad that the ongoing expansion in the company led to construction of more CNG filling stations in Nigeria. He found that the more platforms were created for gas utilisation, the better for the country as Nigeria has an abundant gas resources. He indicated NGC’s willingness to support willing partners like NIPCO to develop NGV businesses while stimulating economic growth at the same time. Mohammed also underlined that thanks to good management of the terminal/station-described as the best ever seen during his serve as depot manager in the Nigeria National Petroleum Company (NNPC)-NIPCO depot ranks the greenest. The Apapa station has a seamless operation, also thanks to its high level of automation. NIPCO Plc’s managing director Venkatapathy Venkataraman said that the firm was very passionate about the Oil & Gas industry in which the firm has invested hugely in this regard. Venkataraman said that government initiative in promoting CNG as transport fuel would improve domestic consumption of gas and reduce fuel subsidy on petrol. Earlier in November 2011, NIPCO announced a plan to provide CNG in 5,000 tank stations with its partners and over 100 NIPCO dealer stations across Nigeria. Using CNG in cars would allow 50 percent savings in fuel costs while enhancing the air quality. The NGC-NIPCO JV had completed six CNG stations in Benin, Edo State, serving more than 250 CNG taxis. Ibrahim Njiddah, senior special assistant to the President on Energy Partnership, Applauded NIPCO during his past visit, “Your efforts in championing the use of CNG and LPG as auto fuel is promising and your expansion programmes in the industry should be made realisable and reality in no distant future”.

Nigerian government ended oil subsidy early this year. Hence, prices of petroleum fuels increased significantly. This move could encourage motorists to switch to bifuel CNG should sufficient refuelling network be available.
About NGC

The Nigerian Gas Company Limited (NGC) was established in 1988 as one of the 11 subsidiaries of the Nigerian National Petroleum Corporation (NNPC). It is charged with the responsibility of developing an efficient gas industry to fully serve Nigeria’s energy and industrial feedstock needs through an integrated gas pipeline network and also to export natural gas and its derivatives to the West African Sub-region. NGC is committed to adding value to natural gas and making it an energy resource of first choice for the benefit of all stakeholders. The company was initially established to efficiently gather, treat, transmit and market Nigeria’s natural gas and its byproducts to major industrial and utility gas distribution companies in Nigeria and neighbouring countries.

In order to deliver efficient services to the numerous customers the business philosophy has been reviewed to focus on Transmission, Distribution and Marketing of Natural Gas.

About NNPC

The Nigerian National Petroleum Corporation (NNPC) is the state oil corporation through which the federal government of Nigeria regulates and participates in the country’s petroleum industry.
A new IGU report on NGVs is released

The International Gas Union’s (IGU’s) Study Group 5.3 (SG5.3), which operates under Working Committee 5 – ‘Utilisation’ (WOC 5) recently presented a report on NGV market with 2012-2015 agenda.


According to NGV Global article, a big chunk of the report discussed about NGV market profile of various continents and countries, but also the respective regulations, government support, important technological trends, cylinder, refuelling and other equipment, etc. Collectively, growth of natural gas vehicles (NGVs) worldwide is more than 12 times that recorded for 2000.

The report cites three examples of rapid change:
1. Iran has joined Pakistan at the top of the country list for NGV population
2. India has listed 201 cities where CNG and LPG facilities will be installed in coming years and has attained 5th place by NGV population
3. China, a relative newcomer to the NGV market, has increased domestic and imported supply of natural gas and has more than 60 original equipment manufacturers (OEMs) producing NGVs.

This report also presents the stories and facts on LNG-форм-marine segment that include bunkering, etc.

SG5.3 will commence a new three-year period under the leadership of Mr Olivier Bordelanne (GDF Suez). The group will endeavour to fulfil its declared objective for 2012-2015: “To advocate expansion of the use of natural gas by on- and off-road, marine/inland waters, airborne, railroad, farming vehicles thus making world mobility cleaner, safer and cheaper”.

All NGV related stakeholders around the world are invited to participate in SG 5.3. To join this unit, contact the Study Group Chairman, Mr Olivier Bordelanne – olivier.bordelanne@gdf-suez.com — or the Vice Chairman Mr David Graebe – David.Graebe@gazpromgermania.de — for details of how to participate.


CNG home refueling is not a new technology. US-based BRC FuelMaker, Japan and Czech manufacturers, etc have been offering this product for many years. The presently existing appliance (also so-called Vehicles Refueling Appliance or VRA) is sold at around USD5,000 per unit and requires long filling times that normally done overnight. Mind you that today’s CNG station have a fast-fill refueling time (around 3-5 minutes to refuel a car), while the homerefueling with low inputgas pressure and limited compression capacity has a slow-fill mode, and thus, takes around 5 to 8 hours to refuel a vehicle.

However, GE is developing a unique fueling approach that would replace more expensive and complex compressor technologies used today. The initial target market includes fleet vehicles owners, with an eye to owners of passenger vehicles (private individual) in the future.

The newly developed system of GE is expected to reduce refueling system cost by 10 times. The product is expected to cost as much as USD500 per unit only, according to ARPA-E’s target. Also, the fuelling time is anticipated to be kept under one hour. This unit can be installed in the driveway or garage at home. This aspect alone would reduce land costs required to install common CNG station. The system is designed to chill, density and transfers CNG more efficiently. It will be a much simpler design with fewer moving parts, and that will operate quietly and be virtually maintenance-free. Once mass marketed, the new system would be able to reduce the barriers to NGVs adoption: refueling inconvenience and low availability of refueling stations. CNG home refueling appliance is mainly suitable for areas with gas pipeline connection. Otherwise, a separate gas storage tanks are required to supply the fuel to the appliance. The 28-month project that requires USD2.3 million will be funded by ARPA-E and GE. GE will be partnering with Chart Industries and scientists at the University of Missouri to complete the program. GE researchers will focus on overall system design integration. Chart Industries and University of Missouri will take care the detailed engineering, cost and manufacturability of the key system components.

On the other hand, GE recently introduced the CNG In A Box™ technology which takes natural gas from a pipeline and compresses it on-site at an industrial location or at a traditional automotive refilling station to then turn it into CNG, making it faster, easier and less expensive for users to fuel up natural gas vehicles.

About GE Global Research

GE Global Research is the hub of technology development for all of GE’s businesses. Our scientists and engineers redefine what’s possible, drive growth for our businesses and find answers to some of the world’s toughest problems. We innovate 24 hours a day, with sites in Niskayuna, New York; Bangalore, India; Shanghai, China; Munich, Germany; and fifth global research facility to open in Rio de Janeiro, Brazil. Visit GE Global Research on the web at www.ge.com/research. Connect with our technologists at http://edisonsdesk.com and http://twitter.com/edisonsdesk.
The European Commission and Dutch government are offering financing for the adoption of LNG in transport sector. The role of this fuel is increasingly important and popular since last year. To help speeding up the development of LNG for transport, NGVA Europe is going to hold “LNG 4 Trucks & Ships Workshop” in Amsterdam on 19-21 September 2012.

During the workshop, table top exhibition and outside vehicle display will also be held.

Book your table and join the other exhibitors!

Ballast Nedam IPM, Cryostar, Emerson Process Management Flow B.V./Micro Motion, Vanzetti Engineering, Iveco Schouten (vehicle display), Rolande LNG, etc.

Highlight your company and product presence, and meet the marine and road vehicles, fuelling stakeholders, and government representative.

Contact:
info@LNG4TrucksAndShips.com

Check the workshop programmes at www.LNG4TrucksAndShips.com

The event will also incorporate a technical tour*, CNG boat canal cruise, networking session, and exclusive workshop presentations and discussion panel members from: Dutch Ministry of Economic Affairs, Agriculture and Innovation/Agentschap, Dutch Commission for LNG regulations, Ballast Nedam, Gas LNG Europe/Gas Infrastructure Europe, Peter Shipyard, Pro Danube, Emerson Process Management Flow BV/Micro Motion, Rolande LNG, MAN Diesel & Turbo, KIWA Netherlands, TUV Saarland, NGVA Europe, Cryostar SAS, Gasrec, Wesport, Vanzetti Engineering, Ecofys, and many others. Book your seat at the technical tour’s bus.

Register your workshop participation before 15 July and meet the “crème de la crème” stakeholders.

The Dutch and EU initiatives

The European Commission is about to sign contracts to finance the demonstration of the use of LNG in trucks within this year or early 2013. The commission is also foresees a global finance of €80 euro since 2014, in which Natural Gas Vehicles including those with LNG and dual fuel system will play an essential role.

Dutch Ministry of Infrastructure and Environment has been offering €10 million subsidies for inland waterways sector while the importance of “safe and sustainable” inland waterways is gaining more and more attention accordingly.

In line with this, recently, the Dutch Ministry of Economic Affairs, Agriculture and Innovation through its exclusive organisation AgentschapNL and private sectors signed an agreement on “Green Deal” to adopt hundreds of LNG or dual fuel barges, ships, and Heavy-Duty trucks by 2015.

Additionally, Ballast Nedam is targeting to build 60 LNG filling stations to serve 10,000 HDVs by 2017-2022 while other LNG providers also adding new stations.

*See the technical tour invitation at http://www.youtube.com/watch?v=PdIKqzq84q8
Now available: the new WEH® catalogue for CNG refuelling

The new, hot off the press WEH® product catalogue for CNG refuelling is even better and more detailed than ever before. It is available in German and English, and showcases in 140 pages our large variety of high-performance WEH® components for natural gas vehicles and fuelling stations.

Newly designed and clearly structured, the catalogue features many product innovations for refuelling of NGVs (natural gas vehicles). Detailed illustrations of the wide range of products and accessories are provided.

The well-proven WEH® fuelling nozzles, receptacles and break-away couplings are still the highlight of the catalogue. Complete refuelling assemblies, consisting of the fuelling nozzle, hose and break-away coupling have been included as well.

The catalogue is available from now on and can be easily downloaded as a PDF file at www.weh.com/ngv-catalogue. For questions or if you would prefer a printed version of the catalogue, please feel free to contact us. You may reach us by email at ngvsales@weh.com or by phone at +49 (0) 7303 951900.

For further questions or pictures please contact: Dennis Kropf - WEH Public Relations - eMail: presseinfo@weh.com - Phone: +49 7303 95190-551 - WEH GmbH: Josef-Henle-Str. 1 - 89257 Illertissen - Germany • www.weh.com

Compac DCA

The Compac DCA (Driveway Card Acceptor) is a stand alone terminal designed to make refuelling and site management easy. It that works seamlessly with your dispensers to offer secure unattended refuelling, 24 hours a day, 7 days a week.

The DCA allows you the flexibility to manage your site as you need. Accepting a variety of devices, the DCA authorises fuel delivery for approved users.

The devices include third party cards, white cards, HID keys, CWID keys and/or pin numbers, with the option of using some of these devices in combination.

User identification at the DCA can be configured to match with the driver or with the vehicle or with both.

In addition odometer readings can be recorded at the time of refuelling with a PinPad prompt.

For downloading fuel delivery data from the DCA there are two options: CompacOnline or USB data transfer.

CompacOnline requires that the DCA has a connection to the internet, with access to data available by simply logging into the CompacOnline website. USB data transfer is a simple method where data is transferred from DCA to computer and back again using a USB stick.

Reading and writing of data is done using an Excel Spreadsheet.

The DCA is a stand-alone unit made from stainless steel. Mounted free-standing on its post the DCA requires no additional shelter.

In addition a receipt printer can be added to the unit.

This is highly reliable, using a waterproof chamber that prevents water damage and paper jams. For more information on Compac’s DCA, CompacOnline or USB Fuel Management visit our website www.compacngv.com or email us at info@compacngv.com
The 4th NGVA Europe International Show & Workshops on natural gas, biomethane, CNG, LNG, and hydrogen blends vehicles will be held in Gothenburg City in Sweden.

The event will be carried out at Svenska Mässan—the Swedish Exhibition & Congress Centre—from 11 to 13 June 2013. Svenska Mässan is a world-class meeting place located in the heart of Gothenburg City. Its very modern exhibition and conference complex contains various exhibition halls, conference rooms, seven restaurants and the largest hotel in Scandinavia—all at one place. The expo venue is situated within easy walking distance of restaurants, entertainment, shopping, sport, culture and services it provides the ideal opportunities for all sorts of ancillary arrangements. The event venue is located next to Gothenburg concert hall, museum, art exhibition building, Museum of World Culture, etc.

During the last decade, Sweden has shown a significant development in the NGV market with 110 percent growth in 2002-2011. The country has merely 204 NGVs and 8 CNG filling stations in 1996. In 2002, there were 3,309 NGVs and 30 stations that grew to 40,029 vehicles and 183 methane filling facilities (179 CNG and 4 LCNG stations). The methane dispensing facilities are supplied by biomethane as well as natural gas. When ones speak about biomethane, most people think immediately about Sweden, one of the leading producers of this renewable gas. Holding an NGV exhibition and workshop in this capital nation of biomethane is in line with the EU’s policy to promote the renewable gas industry. The EU has been financing “Biomaster” project to increase production, distribution and utilization of biomethane in transportation. Through this initiative, EU stakeholders will construct 12 biomethane production plants in Italy, Sweden, Great Britain and Poland. The project was started in 2011 and will be concluded by 2014.

With “LCNG, bio & natural gas—The Fuel alternative for all transport” as a theme, this NGVA Europe main event is supported by Energigas Sverige-Swedish Gas Association, sponsored by Volvo Trucks, and organized by The GVR/NGV Communications Group. This event will attract people from all over Europe and the rest of the world.

The Swedish Exhibition & Congress Centre Svenska Mässan

www.ngv2013gothenburg.com
info@ngv2013gothenburg.com
FHT VERSUSGAS is a producer of core components of VERSUS Sequential Gas Injection systems.

“We are preparing our organization to start two innovative R&D projects in which main targets are:
- The project of Electronic Control Unit already downsized, with our best “know-how” included.
- New project of CNG pressure regulator oriented on the most recent expectations of the installers as well as still improving car manufacturers technology that requires down-sizing matched with perfect performance also in case of mechanical components production.

Last stage of the projects is going to be the investment in new machinery to follow with the market demand.

With the beginning of 2012 the company started several investment projects oriented for next 3 years. Some stage of this plan has already been completed. New and bigger R&D center with over 1000 m2 space has been purchased.

We deeply believe that all of these steps would be the beginning of “FHT VERSUSGAS way”, that finally would place our organization among top players in NGV sector within few incoming years” said Korczynski.

All management processes in FHT VERSUSGAS are performed according to ISO 9001;2008 Quality Management System. Since April 2011 FHT VERSUSGAS obtained ISO 15500-9:2001 certificate for the CNG pressure regulator Type VR-C. “This is the first certified this type of production line existing in Poland. This only underline to our customer that we wish to pay our special attention to quality oriented approach in the future as well” said Wojciech Korczynski – General Manager of FHT VERSUSGAS.

As a company investing a lot in customers management and relationship system FHT VERSUSGAS hereby invite to visit its stand during NGV 2012 Bologna exhibition - stand no D1. This would be perfect opportunity to discuss any issue referring to the relationships to be built with any of our potential or existing business partner. You are welcome here!

FHT VERSUSGAS hereby invites its potential business partners to try, test and enjoy the Polish technology of innovation and functionality.

Contact: FHT Export-Import 05-300 Minsk Mazowiecki, ul. Szczecinska 16G Tel.: +48 25 759-42-61, Fax: + 48 25 759-42-51, PL-Poland, www.versusgas.com, info@versusgas.com
### Cities with CNG refuelling stations

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<thead>
<tr>
<th>Country</th>
<th>Number of cities</th>
<th>Last update</th>
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</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>16</td>
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<tr>
<td>Mozambique</td>
<td>2</td>
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<td>South Africa</td>
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<td>Total</td>
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### Natural Gas Vehicles

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<th>Country</th>
<th>Natural Gas Vehicles</th>
<th>Refuelling stations</th>
<th>Monthly gas consumption (M Nm³)</th>
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<td>Total</td>
<td>Cars/LDVs MD/HD buses MD/HD trucks Others</td>
<td>Total Public Private Planned Average consumption (actual report) The consumption in theory</td>
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<td>270.922 20.950 18.595 2.355 1.784 5.108 44.2%</td>
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Notes: The column ‘theoretical monthly consumption’ is calculating total monthly consumption if cars consume 180, buses 3000, trucks 800, and other vehicles 50 Nm³ per month. There is, of course, a huge difference between different truck types. A 44 ton truck may consume up to 8000 (not 800) Nm³ per month.
## Worldwide NGV statistics

<table>
<thead>
<tr>
<th>Country</th>
<th>Cars/LDV's</th>
<th>Gas/DFV's</th>
<th>CNG/NGV</th>
<th>LPG/Propane</th>
<th>Gasohol</th>
<th>Other</th>
<th>Total</th>
<th>Public</th>
<th>Private</th>
<th>Planned</th>
<th>Average consumption (actual report)</th>
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</table>
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